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Predicting Career Choices of Able College Men from Occupational and Basic Interest Scales of the SVIB

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The National Merit Scholarship Corporation was founded in 1955 for the purpose of annually identifying and honoring the nation's most talented youth. Merit Scholarships, which are awarded on a competitive basis, provide financial assistance that Scholars use to attend the colleges of their choice.

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ABSTRACT

High ability men, who were winners of National Merit Scholarships in 1966, were used to study the capacity of precollege Strong Vocational Interest Blanks (SVIB) to predict major and career choices at the end of college. Criterion groups contained 1,031 men in 16 major fields and 780 men planning to enter 10 career fields. SVIB Occupational and Basic Scales were compared, using both univariate and discriminant function predictive methods. For each of the four predictor-criterion conditions a moderately high level of prediction was possible. The Basic Scales, as a predictor set, performed as well as the Occupational Scales. To indicate the interest similarities of Scholars who entered different career fields, criterion groups were plotted in the reduced discriminant space. The results support the use of the Basic Scales in research and counseling and exemplify the utility of the discriminant function method for the validation of interest measures.

PREDICTING CAREER CHOICES OF ABLE COLLEGE MEN FROM OCCUPATIONAL AND BASIC INTEREST SCALES OF THE SVIB

Fred H. Borgen

Large-scale military testing revealed the now familiar relationship between the occupational hierarchy and measured aptitude (e.g., Stewart, 1947). When the total range of ability is considered, general ability emerges as a moderately strong determinant of occupational membership. For groups more homogeneous on ability, however, noncognitive variables become more prominent as determinants of career behavior. In a study of college graduates, Berdie (1955) concluded that "vocational interests better differentiate among curricular groups than do other kinds of tests;" similar results for a college population were reported more recently by Baggaley and Campbell (1967). When somewhat more heterogeneous groups are studied, the relative discriminating power of interest measures diminishes; thus, Cooley and Lohnes (1968), using Project TALENT data and a nationally representative sample of ninth grade boys, found that ability variables were slightly better predictors than interest-related measures ("motives").

National Merit Scholarship winners comprise a unique group for study of the predictive validity of vocational interest measures. Presumably, nearly all have sufficient measured aptitude to enter the most intellectually demanding career fields; typically, median Verbal and Mathematics scores of Scholars on the Scholastic Aptitude Test (SAT) exceed 725, and only about 2% have scores of less than 600 on either SAT subtest. Because of Scholars exceptionally high ability, interests and other nonintellective variables can be expected to play a major role in their career decisions.

This study uses both univariate and multivariate methods to determine, for male Scholars, how well their major and career choices at the end of college can be predicted from their measured interests prior to college. The study also entails a comparison of the new Basic Interest Scales (Campbell, Borgen, Eastes, Johannson, and Peterson, 1968) and the traditional Occupational Scales of the Strong Vocational Interest Blank (SVIB).

METHOD

In the summer of 1966, the new revision (1966) of the Men's SVIB was administered by mail to Merit Scholars entering college in the fall. Of the 1,455 men appointed as Scholars that year, over 90% returned completed SVIBs, with responses to at least 370 of the 399 items. Three-year followup information regarding the major and career choices of these men was collected by mail in 1969, when nearly all were about to enter their final year of college. Followup information was supplied by 1,348 men, 92.6% of the total group. Major and career choices were first coded into standard categories allowing for up to 99 different major and career codes. Some of these specific choices were then reclassified into broader categories, such as life sciences and law-politics. It was possible to classify 1,031 of the men (70.9% of the original group) in 16 major field categories and 780 (53.6%) in 10 career field groups. The specific major and career groups and the number of men in each are shown in Tables 1 and 2.

At the univariate level, each SVIB Occupational and Basic Scale was examined for its ability to separate Scholars in one outcome subgroup (e.g., majors in chemistry) from Scholars in the remainder of the subgroups. This difference was tested for significance by a t-test and the extent of differentiation between the subgroup and the remainder of the sample was measured by Tilton's overlap. At the multivariate level, multiple discriminate function analysis was used to test the capacity of the Occupational and Basic Scales, as independent predictor _sets_, to predict Scholars' major and career choices.

RESULTS

Univariate Analyses

Tables 1 and 2, for major and career groups respectively, compare the best single predictor scales from among the Occupational and Basic Scales. "Best" differentiation implies that the particular scale separated the criterion subgroup (e.g., engineering) from the remainder of the sample (e.g., nonengineering majors) with minimal overlap. Using a t-test for group differences, all of the scales listed made this differentiation at the .001 level of significance. Generally, for each criterion subgroup the three most differentiating scales are listed in order, with the scale with the smallest overlap listed first. Occupational Scales logically expected to differentiate the subgroups are underlined in Tables 1 and 2. In some cases these _a priori_ scales were not among the best three predictors; such cases are denoted by parentheses enclosing the scale name.

Major Groups. In Table 1 the "best" of the Occupational Scales was the Music Teacher Scale, differentiating a group of majors in Art-Music-Speech with an overlap of 53%. The same group was also well differentiated by the homogeneous Art Scale (overlap: 57%). Majors in Biology were also well differentiated, with overlaps of 54% for both the homogeneous Nature Scale and the empirical Osteopath Scale. Generally, there were meaningful patterns for the best predictors from both the Occupational and Basic Scales. For example, the Mechanical Scale was discriminating for Engineering, Physics, and Chemistry majors, but particularly so for Engineering; the Science Scale also identified these three groups, but was superior to the Mechanical

Scale in separating majors in Physics and Chemistry. Scholars majoring in Mathematics and Psychology were not well demarcated, however, by any of the SVIB scales; particularly weak was the differentiation of the Psychology majors, with no significant separation for any of the Basic Scales and an overlap of 90% for the Psychologist scale. Also difficult to differentiate was the group of Liberal Arts majors, but the probable diversity of this group makes this result unsurprising.

Career Groups. The Mathematician scale was not a good predictor for Scholars planning careers as Mathematicians (overlap of 92% in Table 2). Performance of the remaining *a priori* Occupational Scales in predicting career choice was good, with overlap ranging from 60 for the Engineer and Biologist scales, upward to 79 for the Author-Journalist scale. Likewise, prediction of career fields by the Basic Scales was generally meaningful and at a satisfactory level. The Medical Service scale was notably better than the Physician scale in identifying entrants into medicine (54% vs. 69% overlap), and the Law/Politics scale was similarly better than the Lawyer scale for separating entrants into law-politics (57% vs. 69%). As in the analysis for major groups, Engineers were somewhat better identified by the Engineer scale than by any single Basic Scale (60% vs. 67%).

Generally, the most discriminating scales--whether from the Occupational or Basic Scales--formed meaningful patterns. Systematic differences between the two types of scales at the univariate predictive level were very minimal. Comparison of overlaps for the best scales from each set shows a median advantage of about 3% for the Occupational Scales.

Stepwise Discriminant Analysis

For computation of the discriminant results it was advantageous to use an adaptation of Cooley and Lohnes' (1962) computer program. The program, however, was restricted to 25 predictor variables for analyses involving cross-validation. Consequently, a preliminary question was whether a subset of the 54 Occupational Scales scored on this sample could--in the multivariate predictor space--adequately represent the total set.

Stepwise discriminant analysis was used to examine changes in the discriminative predictive power of the Occupational Scales as more of the scales were employed in the discriminant equations. This pilot study used male Scholars in 9 of the major groups listed in Table 1, with one-third of the sample withheld for cross-validation. Analyses were performed by stepwise discriminant analysis program in the UCLA Biomedical series (Dixon, 1965). This method provided for stepwise entry of the variable with the largest F value into the discriminant predictor set. As predictor sets of certain sizes were established, the discriminant functions were calculated for the

Table 1

Occupational and Basic Interest Scales Significantly
Differentiating 16 Major Groups

College Major	N	Occupational Scales	Mean	Over-lap %	Basic Interest Scales	Mean	Over-lap %
ENGINEERING	128	Production	34	58	Mechanical	54	61
		Air Force Officer	41	62	Mathematics	60	70
		Engineer	41	63	Science	62	74
MATHEMATICS	121	Computer Programmer	50	79	Mathematics	58	80
		(Math-Science Teacher)	35	81	Science	59	88
		(Mathematician)	37	81			
PHYSICS	104	Chemist	50	61	Science	63	61
		Engineer	40	65	Mathematics	59	73
		(Physicist)	40	66	Mechanical	51	74
CHEMISTRY	62	Chemist	47	70	Science	62	68
		Math-Science Teacher	37	73	Medical Service	56	77
		Physician	45	74	Mechanical	50	81
BIOLOGY	55	Osteopath	39	54	Nature	53	54
		Physician	48	63	Medical Service	60	61
		(Biologist)	46	73	Agriculture	49	64
LIFE SCIENCES, EXCEPT BIOLOGY	35	Physician	48	65	Medical Service	60	62
		Psychiatrist	44	69	Science	62	70
		(Biologist)	47	70	Nature	46	84
PSYCHOLOGY	61	Psychiatrist	40	88	Social Service	56	89
		Psychologist	43	90			
BEHAVIORAL SCI., EXCEPT PSYCHOLOGY	47	Social Worker	40	72	Social Service	58	79
		Minister	33	74	Law/Politics	61	81
		(Psychologist)	45	81	Teaching	56	87
LIBERAL ARTS	35	Social Science Teacher	27	83			
		Life Insurance Salesman	27	88			
ENGLISH	93	Music Teacher	39	63	Writing	64	66
		Advertising Man	39	70	Art	58	79
		Librarian	47	71	Music	58	85
PHILOSOPHY	40	Lawyer	44	71	Law/Politics	61	80
		Advertising Man	37	75	Writing	62	82
		CPA Owner	35	78	Public Speaking	60	84
HISTORY	81	Social Science Teacher	32	67	Writing	63	73
		School Superintendent	31	68	Teaching	59	74
		Social Worker	40	70	Social Service	58	79
LANGUAGES	23	Music Teacher	37	71	Teaching	59	75
		Minister	33	73	Music	60	78
		Librarian	46	74	Art	58	80
ART-MUSIC-SPEECH	20	Music Teacher	43	53	Art	63	57
		Librarian	50	60	Music	64	64
		Musician Performer	49	62	Writing	63	75
POLITICAL SCIENCE	67	Life Insurance Salesman	33	65	Public Speaking	64	65
		Real Estate Salesman	35	65	Law/Politics	63	69
		Chamber of Com. Exec.	42	66	Merchandising	47	82
BUSINESS	59	Credit Manager	35	65	Business Management	50	67
		Sales Manager	29	66	Merchandising	49	73
		Accountant	31	66	Law/Politics	61	77

Table 2

Occupational and Basic Interest Scales Significantly Differentiating 10 Career Field Groups

Career Field	N	Occupational Scales	Mean	Over-lap %	Basic Interest Scales	Mean	Over-lap %
MATHEMATICS	75	Computer Programmer	53	67	Mathematics	59	73
		Engineer	38	75	Science	61	81
		(Mathematician)	35	92	Mechanical	50	84
ENGINEERING	78	Engineer	42	60	Mechanical	53	67
		Carpenter	26	60	Mathematics	59	73
		Production	35	62	Science	61	78
PHYSICAL SCIENCES	94	Chemist	48	67	Science	63	64
		Physicist	39	70	Mathematics	59	75
		Engineer	39	71	Mechanical	50	82
LIFE SCIENCES	29	Biologist	50	60	Nature	52	61
		Chemist	48	67	Science	63	64
		Dentist	37	67	Agriculture	47	77
MEDICINE	104	Osteopath	36	67	Medical Service	61	54
		Physician	47	69	Nature	46	84
		Physical Therapist	37	72	Science	60	86
COLLEGE EDUCATOR	108	Librarian	44	79	Teaching	57	83
		Music Teacher	34	81	Music	58	89
		Psychologist	45	83	Writing	60	91
EDUCATOR (UNSPECIFIED)	118	Minister	31	76	Writing	62	79
		Librarian	45	78	Teaching	58	80
		Social Science Teacher	27	80	Art	56	85
EDUCATION-SOCIAL SCIENCES	40				Social Service	57	82
COMMUNICATIONS	28	Advertising Man	38	74	Writing	62	80
		Librarian	46	76	Art	56	86
		Author-Journalist	41	79			
LAW-POLITICS	106	Chamber of Com. Exec.	43	57	Law/Politics	65	57
		Personnel Director	34	58	Public Speaking	63	65
		(Lawyer)	43	69	Business Management	47	74

validation sample, and then the number of correct classifications were determined for both the validation and cross-validation samples (see Table 3).

The stepwise results suggest considerable statistical redundancy across the Occupational Scales of the SVIB, at least when viewed from this multivariate perspective. Even the six "best" scales, when compared to the total set, performed relatively well. This was particularly true for the science-other prediction where the hit-rate for six scales was 72% versus 78.7% for 53 scales. (A 54th scale was never entered because of small F-values.) The crucial comparison for this study was between the "best" 22 scales and the total set of 53 scales; for both kinds of cross-validation comparisons this hit-rate difference was less than 3 percent. Therefore, it was concluded that for the purposes of the following analyses, a representative subset of 22 SVIB Occupational Scales could substitute for all of the Occupational Scales with only minimal loss of predictive precision.

Table 3

Percent Hits for Stepwise Prediction of Major Group from Occupational Scales for Male Merit Scholars

	Validation	Cross-Validation	
Number of SVIB Occupational Scales N =	9 Major Groups 411	9 Major Groups 211	2 Major Groups: Science vs. Other 211
6	30.4	20.4	72.0
12	42.6	19.4	70.1
22	46.2	26.1	75.8
38	52.6	24.6	75.3
53	54.3	28.9	78.7

Note.--Major groups combined in cross-validation as science majors are mathematics, chemistry, and biology; other major groups are psychology, behavioral sciences other than psychology, liberal arts, English, history, and political science. Sample sizes for these majors are shown in Table 1.

Multivariate Analyses

The 22 Occupational Scales used in the ensuing analysis were selected so that they would correspond, wherever possible, to the criterion groups and also so that each of the major groups of the SVIB would be represented. The 22 scales selected and their SVIB groups were: I: Physician; Psychologist; Biologist; II: Mathematician; Physicist, Chemist; Engineer; III: Production; IV: Math-Science Teacher; V: Personnel Director; Social Worker; Social Science Teacher; VI: Artist; Music Teacher; VIII: Senior CPA; Pharmacist; IX: Life Insurance Salesman; X: Lawyer; Author-Journalist; XI: President-Manufacturing; and Supplementary Scales: Chamber of Commerce Executive; Physical Therapist.

For the discriminant analyses, it was appropriate to divide the samples into validation and cross-validation groups, setting aside approximately one-third of the men within each outcome subgroup for cross-validation. Using the Occupational and Basic Scales independently as predictor <u>sets</u> and successively predicting major field and career field, four discriminant analyses were run.

There were substantial statistical similarities among the discriminants derived from the four validation samples. In all cases, the first four discriminants were highly significant, while the fifth was of marginal statistical significance. Five discriminants were used for all analyses to provide comparability. For all four predictor-criterion combinations, the first discriminant clearly accounted for the major amount of variance between outcome groups. Percent of variance associated with the first discriminant varied from 44 to 49%, and between 17 and 20% for the second discriminant. All but one of the succeeding discriminants were associated with less than 10% of the between-group variance.

The central comparison of the predictive power of the Occupational and Basic Scales is shown in Table 4. Wilk's lambda can be used as a descriptive index showing the overall differentiation between groups in multivariate space. Lambda varies from 1.0, when no differentiation is possible, to 0.0, when complete multivariate separation of groups occurs. Baggaley and Campbell (1967), in a four-year predictive study using men and women in 18 major fields, report a lambda of .196 with six interest and two abilitv predictors, and a value of .236 when only the six interest variables were used. Although Baggaley and Campbell's inclusion of men and women in the same analysis does make differentiation an easier task, their analysis is otherwise similar to this study and the value of lambda they obtained (.236) can be used as a benchmark. Cooley and Lohnes (1968) report a discriminant analysis predicting membership in six career groups, using as predictors data collected four years earlier when the boys in their sample were in the ninth grade. For abilities predictors lambda was .59 and for a set of interest predictors it was .69. In the context of these studies, all of the lambdas shown in Table 4, ranging from .229 to .257, can be considered impressive. The overall impact of these values suggests that reasonably good multivariate prediction of the careers of these Scholars is possible with the SVIB.

Probably the most important index for comparing the Occupational and Basic Scales is cross-validation hit-rate. Direct hits (Table 4) are those where an exact prediction of the actual outcome group was made using Cooley and Lohnes' (1962) CLASSIF procedure, a maximum likelihood procedure which assigns an individual to a group on the basis of his discriminant scores. In addition, the full hit-miss tables were recombined into 2 by 2 tables representing hits-misses on the science-nonscience dichotomy.

The implication of the relative hit-rates in Table 4 is that the predictive differences between the Occupational and Basic Scales are very minor and unsystematic. There is a very slight tendency for the Occupational Scales to predict major field better, but for the Basic Scales to perform better when the career choice is predicted. These differences are so small, however, that they may be due largely to sampling error.

Even without the aid of a statistical test, it is clear in Table 4 that the hit-rates in the cross-validation samples are clearly better than the chance expectation (base rate) if the largest outcome category had been predicted for each Scholar. Direct hits in the cross-validation sample were nearly twice as great as the base rate, and accuracy in predicting the science vs. nonscience dichotomy was about 50% greater

Table 4

Summary of Discriminant Results
for Occupational and Basic Interest Scales

Criterion Groups and Predictor Scales	Validation Sample		Cross-Validation Sample					
			Direct Hits				Science vs. Nonscience Dichotomy	
	Wilk's Lambda	Direct Hits	Base Rate	Actual Hits	Science Hits	Nonscience Hits	Base Rate	Actual Hits
16 MAJOR GROUPS								
22 Occupational Scales	.229	34.4	12.6	23.6	80.1	72.1	50.6	76.1
22 Basic Interest Scales	.233	34.1	12.6	20.1	76.7	68.0	50.6	72.4
N =	683				348			
10 CAREER GROUPS								
22 Occupational Scales	.233	46.4	14.5	23.0	71.8	66.7	51.3	69.1
22 Basic Interest Scales	.257	47.4	14.5	24.5	79.4	65.9	51.3	72.5
N =	511				269			

than the base rate. Thus, there is little question that SVIB profiles--either Occupational or Basic Scales--have greater than chance predictive power. On the other hand, there is still considerable outcome variance which is not predictable from the SVIB scales. In about three out of four cases an incorrect specific outcome group was predicted by the discriminant score.

To compare discriminant scores derived from different SVIB predictor sets and different criteria, the five discriminant scores for each of the four predictor-criterion combinations were scored for the 1,031 male Scholars grouped in one of the 16 major groups. Correlations were calculated among the discriminant variates (Table 5) and between the discriminants and the Basic Interest Scales (Table 6). In Table 5 the cross-correlations between parallel discriminants show high agreement (r = .88 to .96) among the first discriminants derived under the different conditions, moderate agreement among the second through fourth discriminants, and no consistency for the fifth discriminant. Moreover, extent of agreement among discriminant scores apparently was only slightly affected by either differences in predictors or criteria.

Evaluation of the content measured by the discriminants is possible in Table 6, where correlations are shown between the discriminant scores and the Basic Interest

Table 5

Cross-Correlations Between Discriminant Scores Derived for Four Predictor-Criterion Conditions

Predictor-Criterion Set		Predictor-Criterion Set: Occup; Major	Occup; Career	Basic; Major
Occup. Scales; Career Groups	I	-96		
	II	-86		
	III	64		
	IV	60		
	V	-10		
Basic Scales; Major Groups	I	92	-88	
	II	68	-69	
	III	56	-67	
	IV	53	40	
	V	-30	09	
Basic Scales; Career Groups	I	88	-86	93
	II	73	-66	76
	III	-61	49	-47
	IV	-48	-56	-36
	V	06	17	-25

Note.--Decimal points omitted.

Table 6

Basic Interest Scale-Discriminant Correlations for 1,031 Male Merit Scholars with First Two Discriminants Derived from Different Scales and Criteria

	Discriminants Derived from: Occupational Scales				Basic Scales			
	Major Groups		Career Groups		Major Groups		Career Groups	
Basic Scales	I	II	I	II	I	II	I	II
1 Public Speaking	-56	-08	52	-02	-56	-05	-54	-12
2 Law/Politics	-53	-20	54	03	-54	-10	-62	-22
3 Business Management	-25	-41	24	29	-19	-20	-22	-39
4 Sales	-27	-26	24	14	-21	-23	18	-35
5 Merchandising	-27	-29	24	16	-22	-21	-24	-32
6 Office Practices	-03	21	02	12	-06	-14	-02	-08
7 Military Activities	09	-09	-04	-01	03	-02	07	-29
8 Technical Supervision	34	-18	-30	12	36	-03	32	-13
9 Mathematics	55	-12	-51	09	54	-08	56	-03
10 Science	71	23	-69	-20	77	27	76	17
11 Mechanical	64	06	-62	-02	62	03	60	-08
12 Nature	10	45	-12	-41	07	69	02	42
13 Agriculture	07	22	-07	-24	-02	50	-04	22
14 Adventure	06	-01	-05	-08	04	03	-03	-11
15 Recreational Leadership	-01	-06	04	-13	-05	07	01	01
16 Medical Service	13	48	-15	-63	14	68	17	44
17 Social Service	-44	25	37	-29	-46	15	-38	34
18 Religious Activities	-19	27	12	-27	-16	26	08	26
19 Teaching	-34	38	26	-33	-32	39	28	57
20 Music	-24	42	15	-30	-24	26	-17	40
21 Art	-26	44	18	-29	-31	37	-14	38
22 Writing	-58	27	54	-26	-60	28	-53	36

Note.--Decimals omitted.

Scales. There is similar patterning of correlations for the first discriminants irrespective of the conditions by which they were obtained. The first discriminant is "loaded" at one end by Science, Mechanical, and Mathematics interest, and at the opposite end by Writing, Public Speaking, Law/Politics, and Social Service. This first discriminant appears to represent a Science vs. Communications dimension. Patterns of correlations are less consistent across the second discriminants derived for the four analyses. At one pole of the second discriminant are interests in Nature and Medical Service, with Teaching, Music, and Art more weakly represented. The opposite pole of the second discriminant tends to reflect business interests. This discriminant suggests a Life-Science vs. Business dimension.

Similarities between the two kinds of SVIB scales in the multivariate predictor space were further explored by plotting the centroids (discriminant means) of the criterion groups in the discriminant space defined independently by the Occupational and Basic Scales. Results based on the first two discriminants are shown in Figure 1 for major groups and Figure 2 for career groups. Discriminant function weights previously calculated for the validation samples were applied to full samples (recombined validation and cross-validation samples). To permit plotting of Occupational and Basic Scale discriminants in the same space, discriminant scores were standardized (T-scores) using means and standard deviations from the sample of 1,031 men.

In Figures 1 and 2 the centroids for each criterion subgroup are plotted in a discriminant plane which is common to the Occupational and Basic Scales. For each subgroup, such as engineering majors, a line connects the centroids derived from the two types of scales. If there were no relationships between the two types of scales, some of the lines would be nearly as long as the full discriminant space. In the figures, however, most of the lines are very short, indicating a close congruence between the Occupational and Basic Scales in the joint space. Differences on the horizontal dimension--the first discriminant representing Science vs. Communications interests--are particulary minimal. The only significant differences which do occur are on the vertical dimension measuring the second discriminant.

Figures 1 and 2 map the precollege interests of Scholars who moved into different career areas. Groups plotted at opposite sides of the discriminant space had distinctively different precollege interests, and conversely, groups clustering together had very similar interests. As expected, groups falling near the periphery of the space generally were the easiest to predict from the interest scales.

A meaningful configuration occurred for the major groups (Figure 1). In the upper right quadrant are majors in engineering, mathematics, and the physical sciences. Near the top of the space are men who majored in business and political science, and

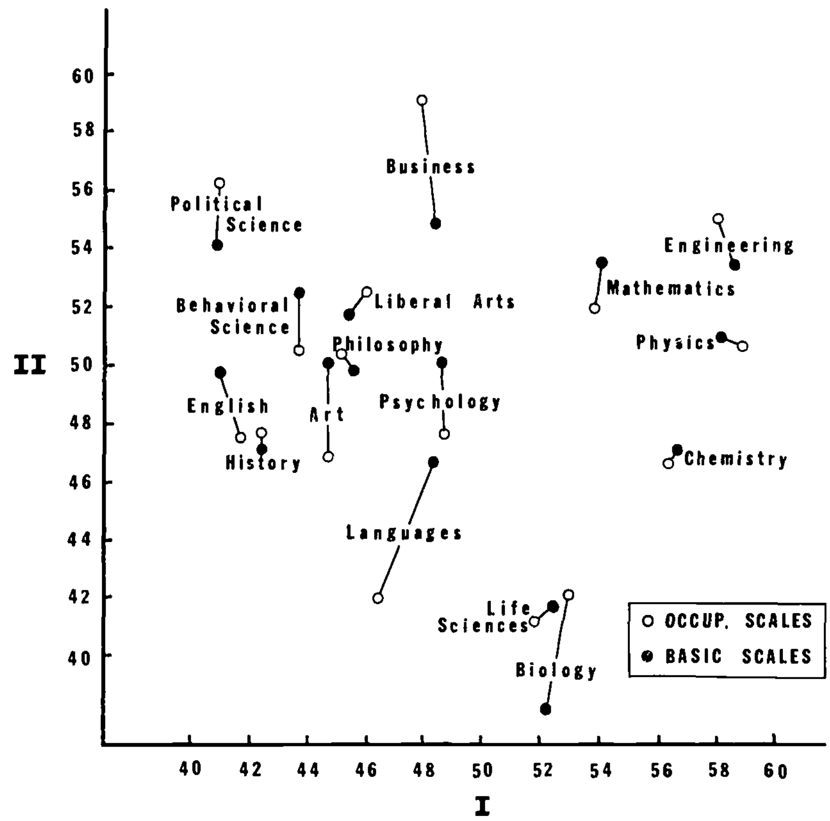

Fig. 1 Centroids of Major Groups on Occupational and Basic Interest Scales in Discriminant Plane

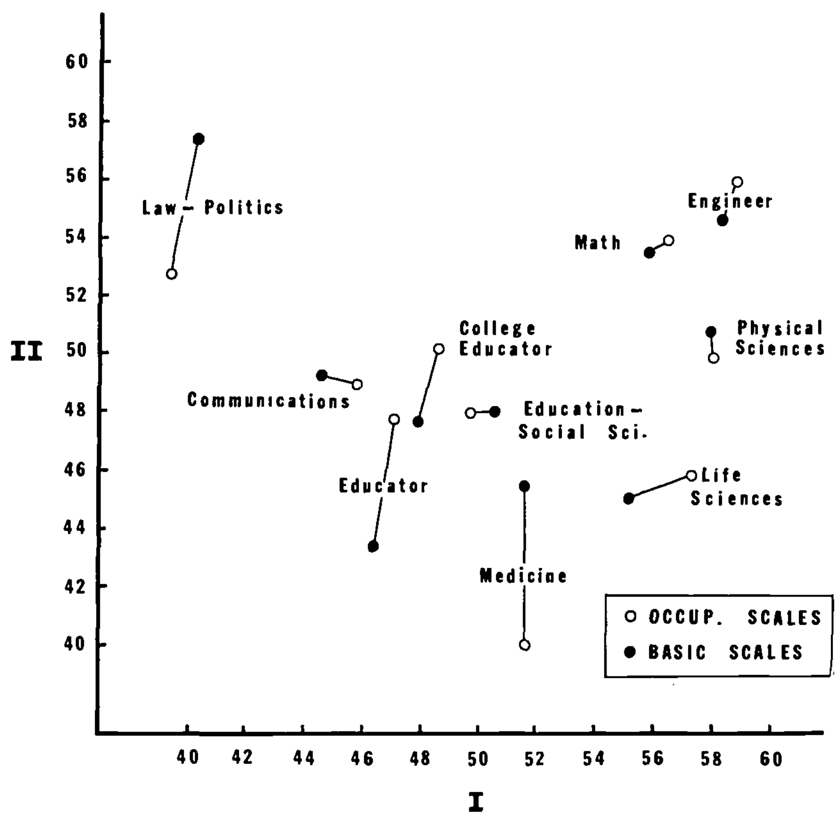

Fig. 2 Centroids of Career Groups on Occupational and Basic Interest Scales in Discriminant Plane

near the bottom are Scholars majoring in biology and other life sciences. Falling close together near the left center of the space are majors in the broad area of the humanities: liberal arts; philosophy; English; history; art; languages; and psychology and other behavioral sciences.

The career groups (Figure 2) form an interest space similar to the one based on the major groups. Again, the mathematics, engineering, and physical science groups appear distinctly in the upper right quadrant. The area of majors in the life sciences now is occupied by Scholars planning careers in medicine and the life sciences. Men planning careers in law and politics are positioned similarly to the majors in political science. In the center of the career space are groups in education, social sciences, and communications; all of these groups are probably quite heterogeneous, and this partly accounts for their central position in the space. It is interesting to speculate how some of the vacant areas in this space might have been filled if larger numbers of diverse occupations could have been used.

DISCUSSION

The results suggest that interests play a larger part in career choice for high ability men than they do for the typical college student. Although there apparently is no strictly comparable study with a representative college sample, comparison of these results with those of Baggaley et al. (1967, 1970), indicates that somewhat better prediction was achieved with these Scholars. Following this demonstration of the effective use of the discriminant function model with the SVIB, it would be desirable to conduct similar validation studies--either concurrent or predictive--with normative college samples. This multivariate approach is useful for comparing validity across sets of scales, different criteria, and different samples, such as men versus women. Moreover, the possibilities for graphic representation of groups in an interest space may be heuristically useful in confronting the theoretical problems of *explaining* vocational interests.

The Basic Interest Scales were not intended to supplant the traditional, established, Occupational Scales of the SVIB. The original need for occupational scales --to predict membership in specific occupations with the greatest possible precision-- remains undiminished. Additional uses for the Basic Scales were intended by Campbell et al. (1968), who stated: "What both the counselor and the researcher need is another system of scoring to supplement the occupational scales, a system containing relatively few scales, but scales which would be used to generalize beyond a single occupation."

Previous studies have supported the validity of the Basic Scales (Campbell et al., 1968; Taylor and Campbell, 1969; Johnson, 1971), and this study adds information about the utility of the Basic Scales. Under both the univariate and multivariate comparisons, the Basic Scales performed as well as the Occupational Scales. The implication is that the Basic Interest Scales can be advantageously used for several purposes in research and practice. First, for research purposes using SVIB profile information, the Basic Scales, with high content validity, account for most of the major dimensions represented in the SVIB Occupational Scales. Consequently, in some studies, the Basic Scales will give results with greater parsimony and psychological interpretability, without great loss of SVIB information.

The Basic Scales have particular counseling value for early vocational exploration, for focusing on broad occupational areas, and for assisting the college student with curricular choice. For prediction of membership in a single specific occupation, the appropriate Occupational Scale continues to be the best method and should be used wherever available.

REFERENCES

Baggaley, A. R., & Campbell, J. P. Multiple-discriminant analysis of academic curricula by interest and aptitude variables. Journal of Educational Measurement, 1967, 4, 143-149.

Berdie, R. F. Aptitude, achievement, interest, and personality tests: A longitudinal comparison. Journal of Applied Psychology, 1955, 39, 103-114.

Campbell, D. P. Handbook for the Strong Vocational Interest Blank. Stanford: Stanford University Press, 1971.

Campbell, D. P., Borgen, F. H., Eastes, S. H., Johannson, C. B., & Peterson, R. A. A set of Basic Interest Scales for the Strong Vocational Interest Blank for Men. Journal of Applied Psychology Monograph, 1968, 52 (6, Part 2), 1-54.

Cooley, W. W., & Lohnes, P. R. Multivariate procedures for the behavioral sciences. New York: Wiley and Sons, 1962.

Cooley, W. W., & Lohnes, P. R. Predicting development of young adults. Palo Alto: Project TALENT Office, American Institutes for Research, 1968.

Dixon, W. J. (Ed.). Biomedical computer programs. Los Angeles: UCLA Health Sciences Computing Facility, 1965.

Johnson, R. W. Use of Basic Interest Scales in interpreting SVIB-W occupational and nonoccupational scores. Measurement and Evaluation in Guidance, 1971, 3, 220-224.

Stewart, N. AGCT scores of Army personnel grouped by occupation. Occupations, 1947, 26, 5-41.

Taylor, R. G., & Campbell, D. P. A comparison of the SVIB Basic Interest Scales with the regular Occupational Scales. Personnel and Guidance Journal, 1969, 47, 450-455.

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